Taxpayers for Common Sense, Austin Clemens, Research Analyst
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-----Original Message-----
From: Austin Clemens [mailto:austin@taxpayer.net]
Sent: Wednesday, May 26, 2004 12:56 PM
To: tom.grim@oak.doe.gov
Subject:

Dear Mr. Grim:

I have attached to this email Taxpayers for Common Sense's comments on the Lawrence Livermore National Laboratory draft site-wide environmental impact statement. The comments are in PDF format.

Thanks,

Austin Clemens
Research Analyst
Taxpayers for Common Sense
651 Pennsylvania Ave., SE
Washington, DC 20003
Phone: (202) 546-8500 x106
Fax: (202) 546-8511
email: austin@taxpayer.net
http://www.taxpayer.net

Taxpayers for Common Sense, Austin Clemens, Research Analyst
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TAXPAYERS FOR COMMON SENSE

Thomas Grim, Document Manager
National Nuclear Security Administration
Department of Energy
Livermore Site Office, L-293
7000 East Avenue,
Livermore, CA 94550-9234

Dear Mr. Grim:

With this letter, Taxpayers for Common Sense (TCS), a non-partisan budget watchdog group, submits our comments regarding the LLNL DSWEIS. TCS strongly recommends that the Department of Energy (DOE) remove from its proposed action for Lawrence Livermore National Laboratory any programs that contribute to the design and planning of a Modern Pit Facility (MPF).

The National Nuclear Security Administration (NNSA) has failed to demonstrate a need for the MPF. Of particular concern is the question of how long plutonium pits last - a question that the NNSA has not answered. The NNSA continues to study the issue, but will not release its study until 2006. Preliminary results state that pits last 45-60 years at a minimum, and respected physicist Dr. Richard Garwin, who has extensive experience with weapons design, has estimated that pits might last as long as 90 years. Our current pits are just 20 years old on average. Unless we are looking at an absolute worst-case scenario, a MPF would be decades premature. Even in such a worst-case situation, pits could be produced at Los Alamos Labs, which could be refitted
1/37.01 to produce up to 150 pits per year, at significant savings. Given the $2-4 billion cost of such a facility, American taxpayers should be concerned about this potentially wasteful project.

Congress has rightly recognized the problem and cut funds for the MPF's design. The NNSA, citing congressional concern, has delayed siting of the facility. Concern over the construction of the facility is widespread, and unites both fiscal conservatives and arms control advocates in Congress. Until the NNSA has proven to Congress and taxpayers that the enormous cost of a MPF is justified, we should not spend taxpayer dollars on planning and designing the facility.

According to the Lawrence Livermore DSWEIS, one upcoming project will demonstrate "a modular system for the modern pit facility foundry," demonstrating that some significant design work is planned under the DSWEIS's proposed action plan. Taxpayers for Common Sense urges the DOE to take into account the premature nature of these programs and halt funding for them.

If you would like to discuss this further, please feel free to contact me at (202) 546-8500 x106 or austin@taxpayer.net.

Sincerely,
Austin Clemens
Research Analyst

A non-partisan budget watchdog
651 Pennsylvania Avenue, SE • Washington, DC 20003 • Tel: (202) 546-8500 • Fax: (202) 546-8511 • staff@taxpayer.net • www.taxpayer.net

The Magic Carpet, Eileen Jorgensen
Page 1 of 1

-----Original Message-----
From: Paul Jorgensen [mailto:magiccarpet@sbcglobal.net]
Sent: Friday, April 23, 2004 8:23 AM
To: tom.grim@oak.doe.gov
Subject: nuclear build up at Livermore

Dear Mr. Grim,

1/04.01 I am writing as a concerned citizen to express my dismay about the buildup of nuclear material at Livermore Labs. I am calling on the conscious of people like yourself, Tom, to question the long term wisdom of this plan.
America needs to lead the world in peaceful settling of misunderstanding, differences and the raw hatred that is so present in the world today.
America, instead, is generating this hatred and my European relatives as well as my Asian associates are perplexed at our idiotic. We are losing on every front and as a senior member of this society, I am gravely concerned that we are leaving future generations a tangled web of chaos, debt, spiritual impoverishment and cultural dysfunction.

Please let me know what I can do to stop this insanity. Please consider your part in all this.

Best, Eileen Jorgensen

a thing of beauty...a joy forever.
Paul and Eileen Jorgensen
The Magic Carpet
(530) 265-9229
408 Broad St
Nevada City, CA 95959
www.themagiccarpet.biz

The Radio Activist Campaign (TRAC), Norm Buske, Director
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May 27, 2004
Dear Mr. Grim:
Please consider the following public comment on the LLNL SW/SPEIS, including the attachment, "LLLdata4412.pdf".

Sincerely,
Norm Buske
Director, The RadioActivist Campaign (TRAC)
<www.radioactivist.org>
(360) 275-1351
7312 N.E. North Shore Road
Belfair, WA 98528

SUMMARY:
The National Nuclear Security Administration (NNSA) employs a methodology in its environmental impact statement (SW/SPEIS) for the Lawrence Livermore National Laboratory that parallels the methodology LLNL employs in its environmental reporting. Therefore, the technical validity of the LLNL SW/SPEIS can be checked by checking the validity of LLNL's ENVIRONMENTAL REPORT 2002.

It is much easier to "predict" present impacts than future impacts. Thus, NNSA must pass the easier test of reporting present impacts from LLNL objectively before predictions of future impacts can be credited as valid.

The RadioActivist Campaign (TRAC) began a radiological survey outside LLNL, in December 2003. Analytical results of those initial samples demonstrate that LLNL's environmental reporting is technically invalid and is not protective of LLNL's environment and neighbors. This demonstration is true on a "more probable than not" basis.

In consideration of the methodological parallels with LLNL's environmental monitoring program, the LLNL SW/SPEIS is legally insufficient. The LLNL SW/SPEIS
1/31.04 should be redone to provide objective assurance of the validity of the resulting environmental impact statement. Therefore, the LLNL SW/SPEIS should be withdrawn and the fundamental deficiencies corrected.

INTRODUCTION:
The National Environmental Policy Act (NEPA) sets legal standards for sufficiency of Environmental Impact Statements (EIS). To be legally sufficient, an EIS must employ a systematic, objective approach that "insures" realism of the detailed statement of the environmental impact of the proposed actions. Therefore, the proposed actions of a legally sufficient EIS must be demonstrably realistic; that is to say, "technically valid."

The approaches for assessing the environmental impacts employed in the LLNL SW/SPEIS are described in Sec.5.1, Methodology. Neither there or elsewhere in the LLNL SW/SPEIS is there any evaluation of realism (i.e., technical validity) of the

The Radio Activist Campaign (TRAC), Norm Buske, Director
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analyses of environmental impacts. Indeed, the only statement corresponding to the validity of the LLNL SW/SPEIS appears in the last paragraph of the Cover Sheet, namely that the LLNL SW/SPEIS is "timely".

2/24.04

Even though the LLNL SW/SPEIS fails to validate the document's conclusions, they might yet be realistic but not validated. However, lack of technical validation does open the question of whether the analysis and their conclusions in Chapter 5 of the LLNL SW/SPEIS are legally sufficient.

One way for NNSA and the concerned public to check the validity of the analyses underlying the statement of environmental impact in the LLNL SW/SPEIS is to check the analyses of the existing environmental impact of LLNL, as reported in the LLNL ENVIRONMENTAL REPORT 2002 (UCRL-50027-02), against reality. That is to say if the analyses of the existing environmental impact of LLNL are technically valid, then one could justify a confidence in the LLNL SW/SPEIS conclusions. On the other hand, if analyses of LLNL's existing environmental impacts show the conclusions drawn in the LLNL ENVIRONMENTAL REPORT 2002 are unrealistic, then the LLNL SW/SPEIS is logically insufficient, on the basis of technical invalidity. [perhaps you don't need this paragraph?]

Logically, NNSA must demonstrate objective reporting of LLNL's existing environmental impacts for NNSA's analyses of much less certain, future impacts are to meet the legal requirement of sufficient objectivity. --The present is easier to predict than the future.

This logical consideration is strengthened by the parallel designs of the LLNL SW/SPEIS and the LLNL ENVIRONMENTAL MONITORING PLAN (May 1999, UCRL-ID-106132 Rev. 2). The Purpose of the LLNL "Environmental Monitoring Plan (EMP) is to meet the requirements of U.S. Department of Energy (DOE) Order 5400.1" and other DOE orders and guides [p. 1-1]. Similarly, the LLNL SW/SPEIS was prepared "pursuant to NEPA," that is to say, to meet the legal requirements of NEPA.

Both monitoring and LLNL SW/SPEIS plans begin with statements of what is presently on-site and proposed to be on-site. Then various scenarios are analyzed to assess impacts. Present impacts are reported in LLNL's annual environmental reports. Future impacts, with alternative actions proposed on-site, are reported in LLNL's SW/SPEIS. Structurally, the monitoring and SW/SPEIS systems are technically the same. If either is invalid, the other is invalid. One of these systems, LLNL's monitoring program, can be checked for realism by measuring the present environment around LLNL and comparing the results to LLNL's monitoring reports. LLNL's monitoring program must pass this check for the predictions of the LLNL SW/SPEIS to have a reasonable chance of being technically valid.

An opportunity for such a check arose with an independent radiological survey around the LLNL site perimeter in December 2003. That survey was conducted by The RadioActivist Campaign (TRAC), and supported by a grant from the Citizens'

The Radio Activist Campaign (TRAC), Norm Buske, Director
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2/24.04 cont.

Monitoring and Technical Assessment Fund. [that's how we're contractually required to refer to the grant.] The radiological results of TRAC's Preliminary Results are compared to LLNL's ENVIRONMENTAL REPORT 2002 of offsite radioactivity, below, to check the radiological aspect of technical validity of the LLNL SW/SPEIS.

TRAC'S RADIOLOGICAL COMPARISON WITH LLNL ENVIRONMENTAL REPORT: TRAC staff reviewed LLNL's ENVIRONMENTAL REPORT 2002 before designing an independent radiological survey outside the LLNL perimeter fence in December 2002.

TRAC noted that LLNL radiological monitoring addresses radionuclides reported on the site ("often associated with LLNL" [UCRL-50027-02, p. EX-2]. The two cited radionuclides are tritium and plutonium (isotopes). LLNL's off-site radiological monitoring focuses on sampling and analyses for these two radionuclides, as well as gross alpha and gross beta counting.

TRAC advised LLNL that LLNL's offsite radiological monitoring program is not robust, because it analyzes only for radionuclides "often associated with LLNL." For LLNL's environmental monitoring program to be technically valid, many or most samples collected from off-site must be analyzed for a wide assortment of radionuclides that might conceivably be produced or released from a nuclear weapons laboratory like LLNL.

TRAC collected 12 environmental samples from candidate pathways from LLNL in December 2003 and analyzed those samples in TRAC's in-house laboratory. The preliminary results appear in RADIOLOGICAL RESULTS OF INITIAL SAMPLES FROM SOME POTENTIAL PATHWAYS FROM THE LAWRENCE LIVERMORE NATIONAL LABORATORY (LLNL) INTO THE SURROUNDINGS--Part 1 (Rev.3, April 12, 2004) (attached document LLLdata4412.pdf). Please append that report in this comment.

TRAC reported both short-lived (iron-59) and long-lived (strontium-90, cesium-137, and americium-241) downwind or downstream of LLNL [Table 1]. A report of strontium-90 in grass next to a pasture, downwind of LLNL was 190 +/- 160 picocuries per kilogram(wet). That value greatly exceeds a reference value of 8 pCi/kgwet for drinking water, albeit with a low level of confidence.

CONCLUSIONS:
(1) TRAC's initial radiological results demonstrate, on a more probable than not basis, that LLNL's environmental monitoring program is not protective of LLNL's surrounding environment and population. This fundamental failure stems from monitoring almost exclusively for radionuclides "often associated with LLNL" for the purpose of meeting regulatory requirements.

(2) LLNL's radiological monitoring program is insufficiently robust to detect and correct its fundamental inadequacies.

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2/24.04 cont. (3) These deficiencies of LLNL's radiological monitoring program are severe enough to warrant re-design, from the Plan on up.

1/31.04 cont. (4) These demonstrated deficiencies of the LLNL radiological monitoring program translate directly into deficiencies in the LLNL SW/SPEIS. Therefore, the LLNL SW/SPEIS is legally insufficient on the basis of technical invalidity.

(5) The LLNL SW/SPEIS should be rejected as technically invalid. In future EIS preparations, NNSA should include technical validation procedures from the outset. Those procedures will allow early identification of deficiencies and their correction, so the concluding statement of environmental impact is assured to be technically valid.

_______end________

The Radio Activist Campaign (TRAC), Norm Buske, Director
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Radiological Results of Initial Samples from Some Potential Pathways from the Lawrence Livermore National Laboratory (LLNL) into the Surroundings --Part 1 (Rev.3)

by Norm Buske, Director, The RadioActivist Campaign April 12, 2004
<search@igc.org>

Introduction and Purpose

The Lawrence Livermore National Laboratory (LLNL) has provided innovative design and engineering to support the Nation's nuclear weapons program since 1952. The RadioActivist Campaign (TRAC) initiated sampling in the public domain around LLNL in December 2003. This initial sampling seeks to establish a technical foundation to independently assess candidate ***pathways*** of radionuclides from this *world premier scientific center* into its neighborhood. In consideration of LLNL's key research-and-development role in the Department of Energy's (DOE's) nuclear weapons complex, this study has been designed to reveal artificial radionuclides with halflives shorter than one week.

TRAC's main concerns are for airborne and waterborne pathways of artificial radionuclides from LLNL into the surrounding neighborhood. Areas of focal interest are *downwind of* LLNL, which is to the northeast, and *downstream of* LLNL, which is Arroyo Seco to the west and Arroyo Las Positas to the northwest of LLNL.

TRAC plans follow-up sampling in May 2004.

TRAC will base its radiological assessment on the results of these two sampling trips and on inputs from public-interest groups, from concerned citizens, from LLNL, and from published information.

Sampling Narrative

TRAC staff arrived in Livermore on 13 December 2003. Rainfall a few days before had left a mud puddle near the east side of Greenville Road, northeast of LLNL. Eleven liters (=11 kilograms wet = "11 kgwet") of brown water were collected from the undisturbed puddle. This water was later allowed to settle at TRAC's laboratory and split into an unfiltered fraction (Sample 1) and settled sediment (Sample 2). --Sample Numbers are *contextual* rather than *chronological*. Sample Numbers appear in the headers in Table 1 of the Results.

Following heavy rainfall during the pre-dawn hours of 14 December, TRAC collected samples from the bed of Arroyo Seco, below the west (downstream) side of the South Vasco Road bridge. At the time of this sampling, storm run-off water was augmented by flow from LLNL's A1 Groundwater Treatment facility on the east side of the bridge. 21 kgwet of clear flowing, unfiltered surface water were collected (Sample 8). 0.4 kgwet of young sorrel leaves were collected from this location (Sample 9).

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TRAC then proceeded to one of the upstream drainages into Arroyo Las Positas, on the east side of LLNL. This *upstream* location is *downwind* of LLNL. TRAC collected 20 kgwet of clear flowing, unfiltered surface water from the ditch on the south side of the power substation that is on the east side of Greenville Road (Sample 4). This sampling location was upstream of most drains from the substation. TRAC opted to wait for new grass to grow before sampling grass at this location.

TRAC staff observed fog in the uplands to the northeast (downwind) of LLNL. On 16 December, TRAC checked the roadsides between Altamont and Patterson Passes for suitable sampling locations and sample media. TRAC picked 0.3 kgwet of new grass growing below pastureland and above the north shoulder of South Flynn Road, close to the intersection with North Flynn Road (Sample 3).

On 17 December, TRAC drove along Corral Hollow Road, east of LLNL to LLNL's Site 300. TRAC checked roadside vegetation with a Geiger counter, downslope and downgradient of Pit 6 along Corral Hollow Road. TRAC picked 0.3 kgwet of leaves from a tree incorrectly identified as mountain ash, from the south side of Corral Hollow Road, next to the Carnegie S.V.R.A. and opposite a secondary entrance to Site 300. This Sample 12 was apparently downgradient (in the groundwater flow direction) from Pit 6. A sample of 0.3 kgwet of leaves was then collected from an unidentified tree on the north side of Corral Hollow Road, in a wash below a berm near Gate PER-SW05, below Pit 6 (Sample 11).

Later on the 17th, TRAC staff accessed Arroyo Las Positas, northwest (downstream) of LLNL, on the east side of the South Vasco Road bridge. Arroyo Las Positas was free flowing with water from LLNL. 0.3 kgwet of reed grass was sampled (Sample 6). TRAC used a Geiger counter to select sediment in the arroyo bed as Sample 7.

On 18 December, TRAC staff walked the perimeter of LLNL, checking for "hot spots" with a Geiger counter. An anthill outside the southeast corner of the LLNL fenceline exhibited twice background radioactivity. This anthill, located at the northwest corner of the East Avenue and Greenville Road intersection, was about twenty meters from disturbed grounds within the LLNL perimeter fence. 0.05 kgwet of anthill was sampled. The radioactivity of this Sample 10 decreased to background by the time it was re-checked at TRAC's lab. That decrease suggested the initial radioactivity in the anthill might have originated from natural radon gases permeating into the anthill passages underground.

Finally, TRAC picked 0.4 kgwet of young grass (Sample 5) from the same upstream location in Arroyo Las Positas as surface water had been sampled on 14 December (Sample 4).

Methods Summary

Sample selection and collection, narrated above, were the front end of an integrated process through a single-pass, radiological analysis in TRAC's lab, leading to post-analysis and ending in this data report.

Water samples were quiescently evaporated, by microwaves, to paste on plastic film. All other samples were oven dried <100C.

Page 2 Radiological Results of Initial Samples from LLNL Surroundings

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Samples were counted for intervals of 23 hours in a multiply stabilized, well-type, sodium-iodide detector with an energy window from 3 to 3000 KeV. The 8,000-channel, highly nonlinear, acquired spectra were transformed to 165-channel spectra of constant photo-peak width of 3 channels (FWHM). Sample analyses then began with sequential, *true* subtractions of background and reference (standard) spectra.

Each prepared sample was counted as soon as feasible to allow detection of artificial radionuclides with halflives less than one week. Samples were then recounted, and the initial spectrum minus one or more subsequent spectra provided "short-lived decay spectra." Natural thorium and uranium decay chain spectra were matched to sample spectra (—initial spectra, short-lived decay spectra, and final spectra—) and subtracted to minimize their short-lived and long-lived contributions to the sample spectra.

Other than natural thorium and uranium decay chain imbalances, the prevalent short-lived radionuclide in the samples was beryllium-7 (Be-7), with a halflife of 53 days. Be-7 is produced naturally in the upper atmosphere by cosmic ray spallation of nitrogen and oxygen atoms. This *cosmogenic* Be-7 falls to earth in rain. Be-7 is also produced by artificial nuclear reactions. Be-7 results do not seem to warrant reporting with the artificial radionuclide results in Table 1.

Cesium-137 (Cs-137) is a routine TRAC laboratory analysis, after thorium and uranium interferences have been subtracted. Likewise, americium-241 (Am-241), with its x-ray peak for confirmation, is a routine analysis. Iron-59 (Fe-59) is not a routine analysis for TRAC. This radionuclide was counted on its clean peak at 1099 KeV with the 1292 KeV peak as confirmation, and then reconfirmation by re-recounting to check the halflife of 45 days. Uncertainties of the Fe-59, Cs-137, and Am-241 analyses are reported as "±" one standard deviation counting error, as generated by Canberra G2K software.

Strontium-90 (Sr-90) is analyzed by four-point matching a sample spectrum against a standard Sr-90 spectrum, after all radionuclides through Cs-137 have been subtracted from the sample spectrum. This analysis depends on the peculiar shape of the Sr-90 spectrum, with bremsstrahlung features from direct 546 KeV beta decay and subsequent 2186 KeV beta decay, from Compton scattering into the sodium-iodide scintillation detector, and from a characteristic x-ray interaction at about 32 KeV. The standard deviation of an Sr-90 reports is the standard deviation of the repeated results of replicate counts with their separate analyses.

Analysis for unspecified short-lived radionuclides presents challenges: There are potentially so many candidate radionuclides, some unidentified phenomena can easily result in some photopeak(s) being incorrectly attributed to some radionuclide(s) not present in the sample. Such *false positive* results are anti-conservative and improperly raise public concern. On the other hand, if many procedural hurdles are imposed before any short-lived radionuclide is reported, there are excessive *false negatives*, and the environment and public health are inadequately protected. Finally, short-lived radionuclides may disappear before analyses can be replicated independently. This loss of replicability unavoidably compromises the scientific validity of reports of short-lived radionuclides.

Page 3 Radiological Results of Initial Samples from LLNL Surroundings

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Note that some radionuclides of concern at LLNL do not yield substantial photon activity above 3 KeV. Tritium (H-3) and plutonium (Pu-239, Pu-240) are examples. Such radionuclides are not screened well by TRAC's single-pass procedure. On the other hand, Am-241, the decay daughter of Pu-241, usually accompanies plutonium and so may flag the presence of plutonium in a sample.

Results

Preliminary radiological results appear in Table 1, on the next two pages. Before a result is reported here, it must pass through a "detect" screen to avoid a false positive report. Analyses failing to pass this screen are indicated in Table 1 by "--", meaning "not detected."

Sample Numbers in Table 1 are ordered as follows: Samples 1, 2, and 3 are from downwind, northeast of LLNL. Samples 4 and 5 are from downwind but upstream, to the east of LLNL. Samples 6 and 7 are downstream of Samples 4 and 5 and are upwind (northwest) of LLNL. Samples 8 and 9 are downstream, west of LLNL. Sample 10 is anecdotal from the fenceline of LLNL. Samples 11 and 12 are downslope and (hydrologically) downgradient of LLNL's Site 300's Pit 6.

Radioactivity is reported as "pCi" = picocurie. All sample radioactivities are reported on a wet weight basis ("kgwet" = kilogram wet) for easy comparison to drinking water standards based on

one liter = 1 kgwet

Uniform reporting in units of "kgwet" has the added advantage of easy calculation of bio-accumulation factors, in cases where the same radionuclide is reported in both water and vegetation collected from the water. One pCi/kgwet is one nuclear disintegration per minute, in a liquid pound (one pint). To convert radioactivity results to dry weight basis, multiply the radioactivity by the "Wet/Dry Weight Ratio" in Table 1.

"n/a" means "not applicable". "Wet/Dry Weight Ratio" does not exist for water.

To convert radioactivity to becquerels (Bq), multiply by 0.037.

Sample locations are given by North Latitude and by West Longitude, based on WGS 84 datum, with degrees on the side of Table 1 and minutes tabulated.

"Sample Identifier" is the sample tracking number, which is the year, month, day, and hour of sample collection. For Sample 1, the Sample Identifier is 3z1316, where: the leading "3" = 2003; "z" = December; "13" = 13th day of December; and "16" = 16:00 hours = 4:00 PM.

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Table 1. Preliminary Radiological Results from First sampling.

Sample Number. Setting:	1. Mud Puddle	2. Mud Puddle	3. Flynn Pass
Sample Direction from LLNL:	near northeast	near northeast	far northeast
Location:	east side of Greenville Rd, near Hawthorne	as Sample 1.	north side of S. Flynn Rd, west of N. Flynn Rd.
Medium (Material):	unfiltered water	settled sediment	young fine grass
Wet/Dry Weight Ratio:	n/a: 11.22kgwet	984.*	6.8
Photon **Radioactivity** [pCi/kgwet]			
Iron-59 (Fe-59):	--	--	--
Strontium-90 (Sr-90):	--	--	190.±160.
Cesium-137 (Cs-137):	0.02±0.03	0.25±0.06	--
Americium-241 (Am-241):	--	--	--
Latitude: North 37° + minutes:	42.653'	42.653'	42.342'
Longitude: West 121° + minutes:	41.908'	41.908'	38.696'
Sample Identifier:	3z1316	3z1316s	3z1611

* From 11.22 kg puddle water, sediment settled and was dried to 11.4 g.

Sample No. Setting:	4. Positas East	5. Positas East	6. Positas North
Sample Direction from LLNL:	near east	near east	near northwest
Location:	Arroyo Las Positas bed, southeast of substation, east side of Greenville Rd.	as Sample 4.	Arroyo Las Positas bed, east side of S. Vasco Rd, southeast of train station
Medium (Material):	unfiltered water	young fine grass	reed grass
Wet/Dry Weight Ratio:	n/a: 20.38kgwet	6.2	5.3
Photon **Radioactivity** [pCi/kgwet]			
Iron-59 (Fe-59):	--	--	290±90
Strontium-90 (Sr-90):	--	--	--
Cesium-137 (Cs-137):	0.03±0.016	2.9±1.6	8.7±2.1
Americium-241 (Am-241):	--	--	4.5±2.0
Latitude: North 37° + minutes:	41.560'	41.561'	41.810'
Longitude: West 121° + minutes:	41.736'	41.735'	43.008'
Sample Identifier:	3z1411	3z1810	3z1713

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Table 1, Completed. Preliminary Radiological Results from First sampling.

Sample No. Setting:	7. Positas North	8. Seco West	9. Seco West
Sample Direction from LLNL:	near northwest	near west	near west
Location:	near Sample 6	Arroyo Seco bed, west side of S. Vasco Rd. bridge	as Sample 8
Medium (Material):	sediment	water	sorrel
Wet/Dry Weight Ratio:	1.0 nominal*	n/a: 20.66kgwet	8.1
Photon Radioactivity [pCi/kgwet]			
Iron-59 (Fe-59):	--	--	--
Strontium-90 (Sr-90):	--	1.3±0.4	--
Cesium-137 (Cs-137):	--	--	--
Americium-241 (Am-241):	--	--	--
Latitude: North 37° + minutes:	41.807'	40.875'	40.875'
Longitude: West 121° + minutes:	43.023'	43.131'	43.131'
Sample Identifier:	3z1714	3z1409	3z1410

* The dried weight is taken as the wet weight.

Sample No. Setting:	10. fence SE	11. 300 South	12. 300 South
Sample Direction from LLNL:	@ SE corner	South of Pit 6	SE of Pit 6
Location:	NW corner of Greenville Rd. and East Ave.	North side of Corral Hollow Rd., by Gate PER-SW05	South side of Corral Hollow Rd., opposite Site 300 access
Medium (Material):	anthill	tree leaves	tree leaves
Wet/Dry Weight Ratio:	1.0 nominal*	7.9	3.4
Photon Radioactivity [pCi/kgwet]			
Iron-59 (Fe-59):	--	--	--
Strontium-90 (Sr-90):	--	--	--
Cesium-137 (Cs-137):	--	--	--
Americium-241 (Am-241):	--	--	--
Latitude: North 37° + minutes:	40.792'	38.105'	38.005'
Longitude: West 121° + minutes:	41.813'	32.851'	32.542'
Sample Identifier:	3z1811	3z1712	3z1711

* The dried weight is taken as the wet weight.

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Discussion

Although patterns of the artificial radionuclides reported in Table 1 might be inferred from the descriptions of the sample locations, TRAC awaits the second sampling with its results and completion of this study before drawing specific technical conclusions.

General references for relative comparison of the Results in Table 1 appear in Table 2:

Table 2, Comparison Radioactivities for Results in Table 1.

Federal guidelines for surface water quality		
Fe-59	??? pCi/kgwet	???
Sr-90	8. "	(40 CFR 141)
Cs-137	200. "	(EPA-570/9-76-003)
Am-241	15. "	gross alpha (40 CFR 141)

The only radionuclide report that exceeds its comparison reference value is Sr-90 in Sample 3. The report of 190±160 pCi/kgwet greatly exceeds the reference value of 8 pCi/kgwet, but with a low level of confidence. This result invites follow-up sampling during TRAC's second field trip in May 2004. [Sample 5 also measured positive for Sr-90 (at 240 pCi/kgwet), but this measurement failed a form-fit test for detection and so is not reported.]

General description of each of these radionuclides in the LLNL context follows:

Fe-59: Iron-59 is a short-lived radionuclide, with a halflife of 45 days. Fe-59 is produced by neutron bombardment of steel, for example stainless steel in reactor cooling water pipes. Fe-59 can then released into circulating water by processes of corrosion or erosion.

Iron is an essential element in trace quantities and has a bio-accumulation factor up to 30,000.

Sr-90: Strontium-90 is a long-lived radionuclide, with a halflife of 29 years. Sr-90 is a main product of nuclear fission. Sr-90 remains from worldwide fallout from testing nuclear weapons in the earth's atmosphere in the 1950s and 60s.

Sr-90 is a main component of liquid waste streams from inadequately managed nuclear reactors, for example into River Techa from the notorious Mayak facilities and into the River Tom from the Seversk reactors in Siberian Russia. Ordinarily, substantial Sr-90 is only released into the atmosphere from industrial-scale nuclear operations in the event of fire. A fire at the Chernobyl Nuclear Power Station in Russia in April 1986 lofted half as much Sr-90 as it lofted its companion fission product Cs-137.

Strontium is in Group 2 of the periodic table of the elements, along with calcium. Sr-90 mimics calcium which is an element essential to cellular control processes. In calcium-poor areas, Sr-90 is concentrated in the food chain, along with calcium.

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Preferential biological uptake of Sr-90 and other natural processes tend to remove Sr-90 fairly quickly from interactions in the biosphere.

The tendency of Sr-90 to mimic essential calcium earns Sr-90 the unusually low guideline value of 8 pCi/kgwet in Table 2.

Cs-137: Cesium-137 is a long-lived radionuclide, with a halflife of 30 years. Cs-137 remains from worldwide fallout from testing nuclear weapons in the earth's atmosphere in the 1950s and 60s.

Six percent of nuclear fissions yield the inert gas xenon-137, with a halflife of four minutes. Xenon-137 in a main gaseous release from stacks of industrial-scale nuclear facilities that retain waste gases for less than half an hour. The released xenon-137 decays to long-lived Cs-137 within a few minutes, and the Cs-137 falls to earth or is rained out, downwind of the release point.

Cesium is a Group 1 chemical element, along with potassium. Cesium binds so strongly to clay particles in soils that uptake through plant roots is quickly minimized. Cs-137 most often enters rooted plants, such as grasses, by absorption of fallout into foliage.

Although cesium plays no ordinary biological role, in potassium-poor environs, cesium is taken up as a substitute for potassium. Natural potassium contains 0.012% of the radioactive isotope K-40, with a halflife of 1.27 billion years. K-40 contributes most of the radioactive burden in the average human body. There is thus some reason to believe that evolutionary processes that might provide some bodily protection against radioactive K-40 might also protect against analogous harms from Cs-137. Cs-137 has the relatively high reference guideline of 200 pCi/kgwet.

In most cases, elevated Cs-137 provides a public warning of the presence of radioactive fission products in the environment. In 2003, TRAC reported traces of Cs-137 seeping into the Rio Grande from Los Alamos National Laboratory, as an "early warning." TRAC also reported Cs-137 from fallout in 2003, at a level of "public health concern," downwind of the Department of Energy's Savannah River Site (SRS) in South Carolina. Downwind of SRS, Cs-137 was at least a factor of ten higher than reported here, downwind of LLNL.

Am-241: Americium-241 is a long-lived radionuclide, with a halflife of 433 years. Am-241 is a byproduct of production of artificial plutonium by neutron bombardment of natural uranium-238. Am-241 exhibits a distinctive photopeak at 59.5 KeV, making Am-241 a readily detectible fingerprint of plutonium.

Americium, plutonium, and other alpha-particle-emitting *actinides* warrant special attention because of their radioactive toxicity. The actinides concentrate and remain in bones, kidney, and liver tissues, where their alpha radioactivity is carcinogenic.

Radiological studies in 1996 and 1997 —after the world's largest underground nuclear explosion, 5 megaton yield "Canninkin" on 6 November 1971, under Amchitka Island in Alaska's Aleutians— reported Am-241 at one pCi/kgwet in aquatic vegetation. That evidence of leakage of artificial actinides from U.S. nuclear weapons testing into the aquatic environment has prompted responsive governmental actions that continue. Although the reported Am-241 content of Sample 6 of the

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present study is greater than the radioactivity of the Amchitka samples, the Am-241 content of Sample 6 is far below the official guideline of concern, 15 pCi/kgwet for gross alpha radioactivity.

For more information:

For a comprehensive background to the subject of radioactivity in the environment, see Merril Eisenbud's **Environmental Radioactivity from Natural, Industrial, and Military Sources**, published by Academic Press.

Check out <www.radioactivist.org> to see how this study compares to other TRAC projects. Go to <www.resolve.org> for information about other studies funded by the MTA Fund.

For information about LLNL's Environmental Community Relations program and environmental monitoring around LLNL by government agencies, go to <www-envirinfo.llnl.gov>.

To learn of citizens' existing concerns for pollution from LLNL, see Tri-Valley CAREs' website at <www.trivalleycares.org>.

To see how LLNL's national security mission fits into the bigger picture of our society and its democratic institutions, visit the Western States Legal Foundation's website at <www.wslfweb.org>.

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Please send your comments or questions regarding this data report to the author. Your feedback will help TRAC provide the most useful information in Rev.2 of this report and in subsequent outreach materials. Thank you.

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